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A new species of non-lichenized genus *Stictis* (*Ostropales*, *Lecanoromycetes*) from India

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Abstract — *Stictis subbrachyspora* is described as new species from India. The new species is characterized by a non-lichenized habit; round, effigurate, chroodiscoid apothecia with white pruinose, lacerate margins, and transversely 19–32 loculate small ascospores measuring 45–55 × 4–5 µm. *Stictis himalayanus* is published as a new combination based on *Chroodiscus himalayanus*.

Key words — *Stictidaceae,* corticolous, *Ascomycota*, *Conotrema*

Introduction

The family *Stictidaceae* (*Ostropales*, *Lecanoromycetes, Ascomycota*) accommodates a large group of lichenized and non-lichenized fungi. The species of the genus *Stictis* Pers. are perhaps the best known example of individuals representing the same fungal species having the ability to live either in a lichenized state (with algal symbionts) or as saprotrophs (non-lichenized), depending on the substrate (Wedin et al. 2004).

Sherwood (1977a,b, 1979) provided a comprehensive account of c. 65 species and separated *Stictis* from allied genera based on the orbicular fruiting body opening by pores, periphysoids in an apothecial margin that extends down the whole length, a hymenium that splits away from the margin when dry, a thick crystalline layer in the ascoma margin and a non-parasitic niche. The ascospores exhibit variation in shape (cylindrical or filiform), size, and septation (with 3–300 septa). *Stictis* was segregated from the closely related *Conotrema* based on the lichenized living strategy and scattered crystals in apothecial margin of the latter (Gilenstam 1969, Sherwood 1977a). A phylogenetic account by Wedin et al. (2006) suggests that *Stictis* is paraphyletic and congeneric with

Conotrema. The other closely related genera — *Schizoxylon* and *Carestiella* — differ from *Stictis* in lacking a periphysoidal layer and having disintegrated spores (Wedin et al. 2005).

Seven *Stictis* taxa have been reported previously from India: *S. bengalensis* U.P. Singh & Pavgi, *S. indica* Tilak & Nanir, *S. kamatii* Tilak & S.B. Kale, *S. lantanae* Tilak & Nanir, *S. marathwadensis* Tilak & S.B. Kale, *S. stellata* subsp. *intermedia* (Speg.) M.P. Sharma & R. Sharma, and *S. tilakii* S.B. Kale & S.V.S. Kale (Kale & Kale 1970, Sharma & Sharma 1983, Singh & Pavgi 1966, Tilak & Kale 1969, 1970; Tilak & Nanir 1975). Some of these are no longer considered to belong in *Stictis*, and others are of dubious application. Sherwood (1977a) synonymized *S. bengalensis* under *S. radiata* (L.) Pers. subsp. *radiata* and recombined *S. lantanae* as *Schizoxylon lantanae* (Tilak & Nanir) Sherwood, placing *S. indica* in synonymy. Sherwood (1977a) was unable to obtain material of *S. kamatii*, *S. marathwadensis*, and *S. tilakii* for study; on the basis of their protologues, she considered that *S. marathwadensis* was probably a *Stictis* sp. distinct from *S. radiata* but was unable to suggest better taxonomic placements for *S. kamatii* and *S. tilakii*.

The present paper reveals the existence of a non-lichenized corticolous species from India that fits well in the genus *Stictis* and is described here as new to science.

Materials and methods

The material (preserved in LWG, the National Botanical Research Institute lichen herbarium) was examined morphologically, anatomically, and chemically. Thin hand-cut sections of apothecia and thallus were mounted in plain water, cotton blue, 5% KOH, and iodine solution and observed under a compound microscope. Chemical spot tests and TLC methods follow methods by Orange et al. (2001). The minimum and maximum measurements of ascospore and other anatomical features are based on the examination of at least five different mature ascomata.

Taxonomic description

Stictis subbrachyspora S. Joshi & Upreti, **sp. nov.** Figure 1

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Thallus corticolus. Ascocarpi primum immerse, erumpescentes, profunde cupulati, 0.5–0.6 mm diam., margin, albo, lacerato. Margo in sectione 60–120(–125) µm crassus. Exipulum proprium brunneum, 30–65 µm crassum; stratum crystallinum 25–50 µm crassum. Periphysoidea ramose, 15–25 µm. Paraphyses filiformes, ramosae, 1–1.5 µm. Asci 8-spori, 80–90(–100)×5–6 µm crassum, I+ carulescens. Sporae 45–55 × 4–5 µm, involutae, I+ aurantiaco-lutescentes.

Typus: INDIA, West Bengal, Jalpaiguri district, Jaigaon, on bark on a river bank, 07.04.1987, D.K. Upreti & M. Ranjan 201675 (LWG–**holotype**).

A non-lichenized fungus, corticolous, forming a hyaline epiphloeodal hyphal felt or thallus, 20–50 µm thick. Ascomata, urceolate, solitary, sometimes aggregated in two, at first immersed, opening by a pore, becoming erumpent and finally nearly superficial, 0.5–0.6 mm in diam., round, chroodiscoid; disc brownish to flesh coloured, densely pruinose, splitting away from the margin, up to 0.4 mm in diam., deeply immersed; margin radiate, effigurate, lacerate, 5–6 lobed, white-pruinose, eroded in older apothecia, 60–120(–145) µm thick in cross section, hyaline to darken in older apothecia, sometimes layered, entirely encrusted in crystals.

Outer exciple layer 40–80 µm thick; inner exciple layer brown, 30–65 µm thick, branched periphysoids present, forming the innermost layer of the margin, 15–25 µm long, separated from the outer wall by crystals (of 20–40 µm in size); crystals forming a dense layer along the inner margin of apothecia, 25–50 µm thick. Epihymenium indistinct, granular, hyaline to slightly brownish, usually covered by 20–40 µm high crystalline layer, hymenium hyaline, inspersed, separated from the margin in dry condition, 100–135(–200) µm high, I+ golden yellow to wine-red; sub-hymenium, 30–50(–260) µm high, hyaline to darken in older apothecia, I+ blue. Paraphyses filiform, branched, with thickened apical cell, dense, conglutinate, 1.0–1.5 µm wide, I+ blue in epihymenial region. Ascus 8-spored, cylindrical, bitunicate, 80–90(–200) × 5–6 µm, I+ blue; ascospores cylindrical to fusiform, hyaline, transversely septate, sheathed, 19–32 loculate, locules broader than longer, 45–55 × 4–5 µm, golden yellow in Iodine solution.

Chemistry: Thallus K+ reddish, PD–, C–; no lichen substance in TLC (Solvent system A).

Distribution and ecology: At present the new species is known only from the northern and eastern states of India, where it is found growing luxuriantly on tree bark in tropical moist deciduous forest at 140–900 m altitudes.

Additional specimen examined: INDIA, Uttarakhand, Jim Corbett Tiger Reserve, Dugadda, on tree bark, 03 Dec. 1999, D. K. Upreti 217467 (LWG).

Remarks: *Stictis subbrachyspora* is characterized by non-lichenized thalli, round erumpent, chroodiscoid apothecia with radiate, lacerate, pruinose margins, flesh coloured deeply immersed discs, branched paraphyses, periphysoids in the innermost layer, a crystalline layer between excipulum and periphysoids, brown inner exciple, and relatively small 8-spored asci and ascospores measuring 80–90(–100) × 5–6 µm and 45–55 × 4–5 µm respectively.

Stictis brachyspora Sacc. & Berl. is similar to *S. subbrachyspora* in its white pruinose apothecial disc, thick crystalline layer separating periphysoids from outer wall, I+ blue paraphyses at epihymenial region, and an amyloid hymenium that splits away from the margin when dry; it differs in having broadly open immersed apothecia that do not become erumpent, larger ascospores (65–90

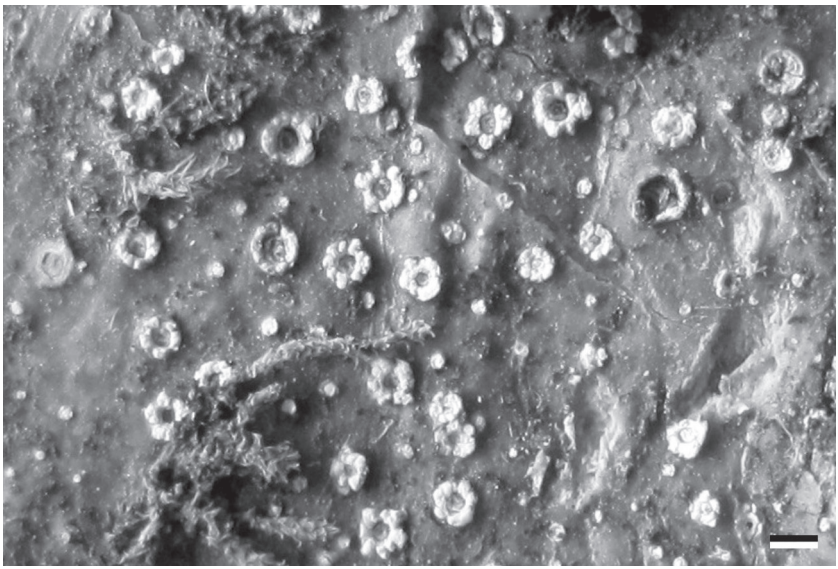

Figure 1. Thallus and apothecial morphology of *Stictis subbrachyspora* (Holotype). Scale: 0.5 mm.

× 3.5–4.5 µm), and an apothecial margin that is 40 µm thick and colourless throughout in cross section.

Stictis friabilis (W. Phillips & Plowr.) Sacc. & Traverso resembles the new species in its 0.3–0.6 mm, erumpent, nearly superficial apothecia with deeply fissured pruinose margins, branched propoloid paraphyses, and small ascospores (55–70 × 2.5–3.5 µm). However, *S. friabilis* differs in having I– paraphyses in epihymenial region, a distinctly reddish apothecial disc with a fleshy yellow-pruinose margin, colourless proper exciple, and unsheathed ascospores (the sheathed ascospore character is not cited in the description by Sherwood, 1977a).

Other closely related taxa *S. lupini* W. Phillips & Harkn. and *S. dumontii* Sherwood, with small ascospores of 45–60 × 3–3.5 µm and 55–65 × 3–3.5 µm respectively, differ from *S. subbrachyspora* in having immersed apothecia. Further, *S. lupini* differs in having an entire apothecial margin, unbranched periphysoids, simple paraphyses, and indistinct exciple while *S. dumontii* differs in having 4-spored asci.

Stictis radiata subsp. *radiata* is comparable to new species in having a lacerate, white-pruinose, apothecial margin, deeply immersed disc, I+ blue subhymenial region, and irregularly branched paraphyses; however, the larger asci (120–250 × 5–8 µm) and unsheathed larger ascospores differentiate it from *S. subbrachyspora*.

Stictis marathwadensis, considered a good representative of the genus, is close to *S. subbrachyspora* in having round apothecia with lobed margins but differs in having white to black apothecia and acicular ascospores that are almost as long as the asci (220–285 × 0.6–1.6 µm).

The genus *Stictis* has a worldwide distribution but most species are common in coastal areas and moist humid cloud forests of tropical countries.

An Indian specimen previously placed in thelotremataceous group due to uncertainty in the delimitation of *Ostropales* has been reevaluated and is now transferred to *Stictis* as follows:

Stictis himalayanus (Nayaka & Upreti) S. Joshi & Upreti, **comb. nov.**

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Basionym: *Chroodiscus himalayanus* Nayaka & Upreti, Mycotaxon 98: 247. 2006.

The taxon is characterized by chroodiscoid apothecia with prominent white exfoliating margins, hyaline proper exciples densely inspersed with calcium oxalate crystals, distinct periphysoids, and acicular transversely septate golden yellow I+ ascospores measuring 40–78(–85) × 3–5 µm. It is similar to *Stictis lupini* and *S. brachyspora* in having simple paraphyses and small ascospores measuring 45–60 × 3–3.5 µm and 65–90 × 3.5–4.0 µm respectively but differs in having erumpent apothecia, orange-brown discs, radially fissured apothecial margins, and 2–3 spored asci. The species is restricted to the Himalayas and was found growing on trees in Great Himalayan National Park, Himachal Pradesh, at an altitude of 2200 m.

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